BLIND-FOLD DESCRIPTION OF DISTANCE.

By

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It is a well-known fact that we miscalculate the distance and direction of objects when we try to approach them with our eyes closed. The paper embodies the result of a series of experiments, devised with a view to determine the amount of error involved in such instances.

Method.—Subjects in these experiments were required to walk blind-folded from a given starting point to fixed goals standing at various distances. The work was carried on in a courtyard measuring 2000 sq. feet (50 × 40 ft.). It was found that even the slightest sound often helped the subject to find his orientation. Hence, all conversation and other sounds were stopped so far as practicable. Familiarity with the ground obviously helps the subject to estimate distances and directions with a large degree of accuracy. Thus, the ideal ground would be one which is equally unfamiliar to all. Since this condition could not be fulfilled, the experiments were conducted in a place which was, to all appearances, equally familiar to all.

A line marked by chalk connected the starting point with the goal which was a small inverted jug. The subject was made to stand at the starting point and asked to look at the object which he was told would be removed as soon as he was blind-folded. When the eyes of the subject had been effectively covered with cotton-wool, he was asked to proceed to the goal as previously seen. The subject was further instructed to retrace his path from the goal to the starting point. A double set of readings was, thus, obtained. The distance between the goal and the spot at which the subject stopped was calculated; the deviations of the subject to the right and the left

of the line marking the path, were also recorded. An attempt was made to estimate the angles of deviation in some cases; but the procedure had to be abandoned.

The *Observation* of the conduct of the subjects brought out certain interesting phenomena—(1) The subject very rarely reaches his final stopping place in a single line, straight or curved; the changes of direction in the track are many. (2) It is seldom that the path is described without three or four halts showing subjective doubt in regard to the accuracy of the path and to the location of the goal. (3) The deflection of the angle between the mesial vertical plane of the head and that passing through the extremities of the collar bone and the tips of the *Illium*, from the normal, at start is often indicative of the deviation from the true track when blindfolded. It was for this reason that the position of the head was adjusted by the experimenter or his agent at the start. But curiously enough there were in many cases a change in the position of the head, unconsciously followed by a deviation from the right course. (4) In many cases there was a tendency to correct the deviation from the goal at the last stage. The place which the subject reached after this correction served as the basis of calculations. Its distance from the goal and its location to the right or left were taken into account in estimating the 'errors.' Since these are the combined products of a series of errors at each phase of the journey, they are termed 'ultimate' errors. (5) A number of subjects were tested in regard to the effect of rotation, clockwise or counter clockwise. The errors showed a large degree of variability and the subjects lost the tendency of correcting the deviation.

The subjects were all Bengalees. They were divided into 4 Age groups. A (6 to 9)—5; B (10 to 13)—13; C (14 to 17)—10; D (19 to 26)—12, making a total of 40. The table A given below shows the average of each of the groups and the total for the distances 10, 25 and 50 feet at the 1st and 2nd trial.

TABLE A.

Group		Distance X 10		Distance Y 25		Distance Z 50	
		1st trial.	2nd trial.	1st trial.	2nd trial.	1st trial.	2nd trial.
A 6-9 N 5							
Total	...	13·1	4·9	26	17·8	70·5	28·9
Average	...	2·62	·98	5·2	3·56	14·1	5·8
B 10-13 N 13							
Total	...	10·5	8·8 5	59·8	34	156·2	87·5
Average	...	·8	·68	4·6	2·6	12·0	6·7
C 14-17 N 10							
Total	...	20·6	13·01	37·04	31·5	111·1	65
Average	...	2·06	1·30	3·70	3·15	11·1	6·5
D 19-26 N 12							
Total	...	26·85	28·5	35·1	21·6	99·4	61
Average	...	2·23	2·3	2·9	1·8	8·28	5·0
Total 6-26 N 40							
Total	...	71·05	55·26	157·94	104·9	437·2	242·4
Average	...	1·77	1·38	3·94	2·62	10·93	6·06

The table B gives the character of deviation, to the tright or to the left; it also represents the facts of overestimation and underestimation.

TABLE B.

The deviations, overestimation and underestimation.

Group		Deviation to the Right.	Deviation to the Left.	Overestimation	Underestimation
A	...	40	86·6	0	60
B	...	30·76	71·79	7·69	69·21
C	...	40	56·6	33·3	63·3
D	...	33·3	61·1	33·8	41·6
Total	...	3·5	66·$\dot{6}$	20·8$\dot{3}$	58·$\dot{3}$

The percentage should be halved for absolute comparison.

It will be noticed that deviations to the right and to the left occurred in 42 and 80 cases respectively out of 240 trials. Thus of the 50 per cent. of the cases, the deviations were in 17·5 per cent. towards the right and in 33·3 per cent. towards the left.

TABLE C.

The influence of distances upon deviations.

Deviation	10 ft.	25 ft.	50 ft.
Right	6'25%	15%	31'25%
Left	10%	37'5%	62%

The largest amount of deviation is towards left for all the distances. The fact of overestimation and underestimation of distances (Table B) shows some interesting features. Out of 240 trials, in 70 cases the subjects stopped short of distances while in 2·5 cases they went beyond the goal. The cases of underestimation are three times as frequent as the cases of overestimation.

TABLE D.

Influence of distance upon overestimation and underestimation.

Distances	10 ft.	25 ft.	50 ft.
Overdone	17'5	11'5	2'5
Underdone	10	32'5	25

The table shows that the tendency of overestimation diminishes with distance while that for underestimation remains fairly constant.

Conclusions.—

1. A remarkable improvement occurs at the second attempt in blindfold description of distances.

2. The error deviation is greater for longer distances and seems to be independent of the initial angle of deviation.

3. The increase in age tends to decrease the amount of the error of deviation and its frequency.

4. In nearly 50 per cent. of trials there was a directional deviation either to the right or to the left. There were twice as many deviations to the left as there were to the right. The tendencies for directional deviation increase with age.

5. In about 40 per cent. of trials the distances were either overestimated or underestimated. The frequency of underestimation was three times that for overestimation. The tendency to overestimation is not much influenced by age, while the tendency to underestimation decreases in the case of higher age-groups. The distance factor clearly tells on the tendency to overestimate but has little influence on the tendency to underestimate which generally gains the upper hand.

6. There is an unconscious tendency to correct the deviation from the right course.

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